

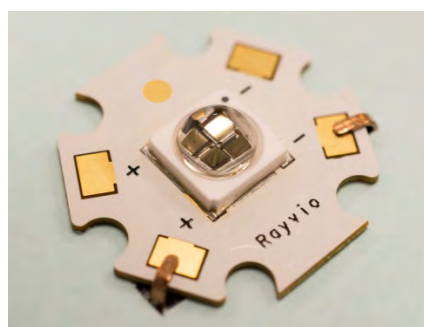
EXHIBIT 2



SMD Ultraviolet Emitter on MCPCB Hex Star (SB4)

High UV power density in easy to use format

Offering the highest radiant output of any UV LED currently available, the RayVio SMD on metal core printed circuit board (MCPCB) Star enables higher radiation density applications. Spectral output peak wavelengths are 285nm and 310nm typical which enable powerful and compact applications in disinfection and skin treatment.



Features and Benefits

UV power output up to 40mW enables higher output, more compact applications

285nm typical spectrum with proven germicidal efficacy and 310nm for skin treatment

Industry standard surface mount device (SMD) package to lower integration costs

Small, bolt-down package with metal core enables simple assembly and high thermal conductivity

Applications

Water disinfection

Surface disinfection

Air disinfection

Food and pharmaceutical processing

UV curing of inks, adhesives and coatings

Horticulture lighting

Skin treatment



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Product Nomenclature

Preliminary part numbers listed below with part descriptions are used to identify part configuration (subject to change)

For SMD part emitter mounted on MCPCB Star:

Part Number	Part Description
RV-285-SMDSB4-00	285nm nominal wavelength, up to 40mW power output
RV-310-SMDSB4-00	310nm nominal wavelength, up to 40mW power output

Other wavelengths are available upon request.

Environmental Compliance

RayVio is committed to providing environmentally friendly products to the healthcare and hygiene management marketplace. RayVio is compliant to the European Union directives on the restriction of hazardous substances in electronic equipment, namely the RoHS directive. RayVio products do not contain the restricted materials: lead, mercury, cadmium, hexavalent chromium, polybrominated biphenyls (PBB) or polybrominated diphenyl ethers (PBDE).

Product Performance and Characterization Guide

Typical Optical Characteristics

Table 1. Performance Characteristics at $T_j = 25^\circ\text{C}$

Typical Wavelength (nm)	Part Number	Radiant Output @ 100mA, 25°C			Spectral Width (nm) (FWHM)	Viewing Angle (deg. HM)
		Minimum (mW)	Typical (mW)	Maximum (mW)		
285	RV-285-SMDSB4-00	16	34	40	15	120
310	RV-310-SMDSB4-00	16	34	40	15	120

Table 2. Performance Characteristics at $T_j = 25^\circ\text{C}$

Typical Wavelength (nm)	Part Number	Emission Peak Wavelength		
		Minimum (nm)	Typical (nm)	Maximum (nm)
285	RV-285-SMDSB4-00	280	285	290
310	RV-310-SMDSB4-00	305	310	315

Notes for Tables 1 and 2:

¹ Production parts are tested at nominal current of 100mA, 25°C.

Typical Electrical Characteristics

Electrical Characteristics of UV device

Solder Pad Temperature = 25°C, Test Current = 100mA

Table 3.

Part Number	Forward Voltage V_f			Typical Thermal Resistance Junction to Solder Pad ($^\circ\text{C/W}$)
	Minimum	Typical	Maximum	
RV-285-SMDSB4-00	24	29	39	6
RV-310-SMDSB4-00	24	29	39	6

Notes for Table 3:

¹ Measured between $T_j = 25^{\circ}\text{C}$ and $T_j = 60^{\circ}\text{C}$.

Absolute Maximum Ratings

Table 4.

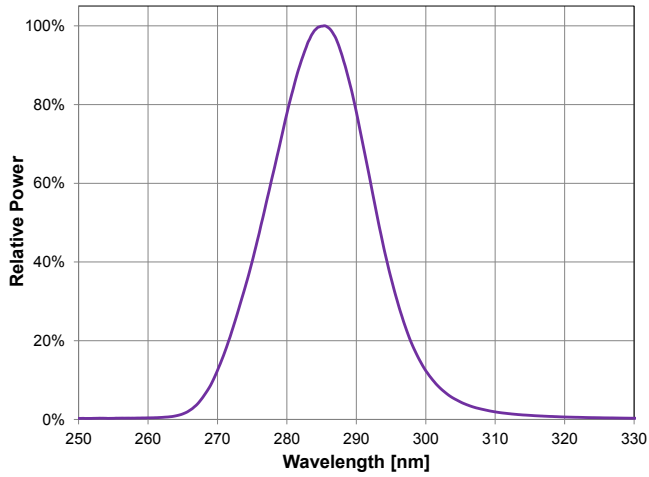
Parameter	Maximum Performance
Power Dissipation	3.9W
Forward Current	100mA
Reverse Voltage ¹	tbd
Junction Temperature, T_j	60°C
Storage Temperature	-30, 100°C
ESD Sensitivity	tbd

Note:

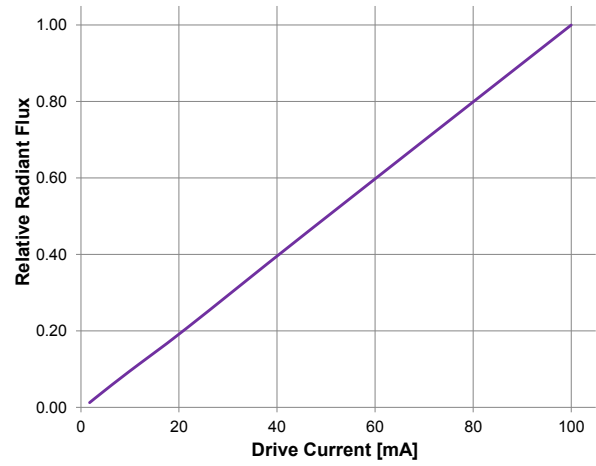
¹ products are not designed for reverse bias operation

Typical Characteristic Curves

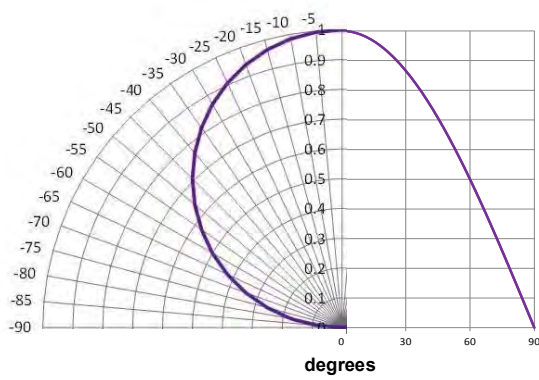
Spectrum



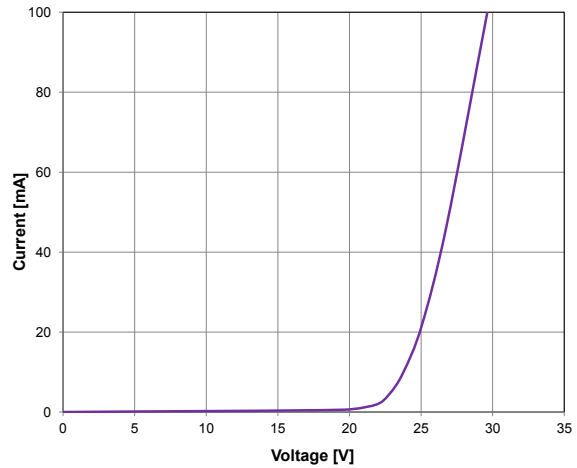
Radiant Power vs. Drive Current



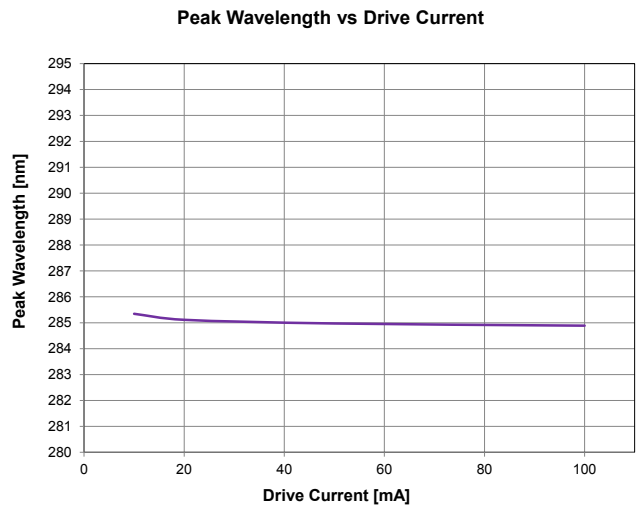
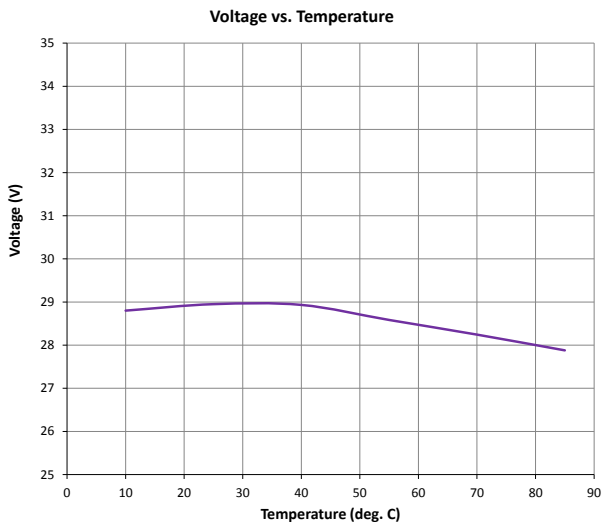
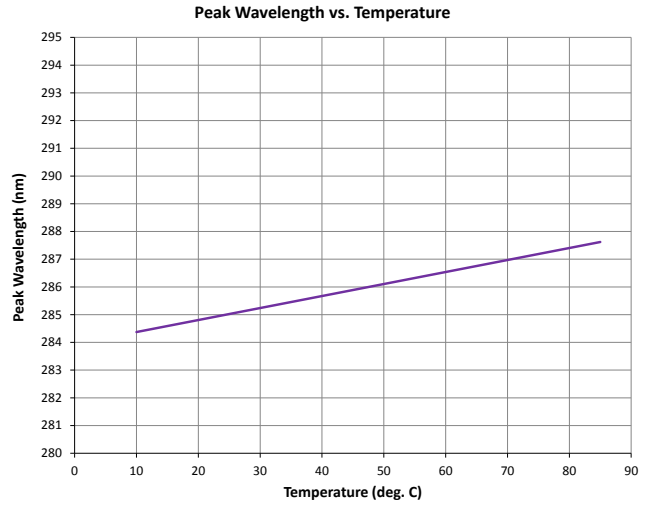
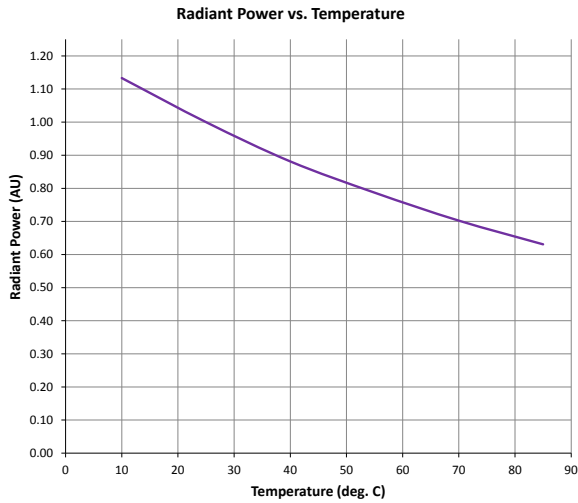
Angular Emission Intensity Distribution



Forward Current vs. Voltage



Typical Characteristic Curves (continued)



Product Binning and Labeling

Purpose of Product Binning

In the manufacturing process, the products described here are produced in a distribution around the typical performance values listed. RayVio sorts and labels products into bins according to output power, peak wavelength and forward voltage.

Product Bin Label Structure

All emitters packaged together are sorted to the same bin. The bin code label is a 9 digit code printed on the label. Combinations of various bins may be used to optimize the consistency of the application.

The bin code labels follow the alphanumeric code structure below.

PxxLxxVxx

Pxx = power output bin

Lxx = wavelength bin

Vxx = Vf bin

Power Output, Peak Wavelength and Forward Voltage Bins

Tables 5, 6 and 7 list the standard functional bins for RayVio emitters (tested and binned at 100mA, 25°C). Although several bins are outlined, product availability in a particular bin varies by production run and by product performance. Not all bins are necessarily available.

Table 5. Power Output Bins

Bin Code	Minimum Power Output (mW)	Maximum Power Output (mW)
P08	16	20
P09	20	26
P10	26	32
P11	32	40

Table 6. Peak Wavelength Bins

Bin Code	Minimum Peak Wavelength (nm)	Maximum Peak Wavelength (nm)
L07	280	285
L08	285	290
L12	305	310
L13	310	315

Table 7. Forward Voltage Bins

Bin Code	Minimum Forward Voltage (V)	Maximum Forward Voltage (V)
V36	24	28
V37	28	32
V38	32	35
V39	35	39

Packing Information

Hex star components are packaged in plastic carrying trays. Detailed specifications tbd.

Product Labeling

Label A

Specifying Part Number, Quantity and Lot Number

Example



Cautions on Use

Eye and Skin Safety Guidelines

Do not directly look at the light when the LEDs are on. Proceed with caution to avoid the risk of damage to the eyes when examining the LEDs with optical instruments. Protect your eyes and skin when operating. Equipment should be designed to completely screen or filter UV radiation.

The attached label should be used on products and systems that use UV LEDs.



Thermal Management

The thermal design of the system must be considered, particularly at the beginning of the system design process. In order to maximize performance it is necessary to reduce heat in the system by optimizing thermal conductivity of circuit boards and housings and also by minimizing density of the LED array and other components.

Static Electricity

Wristbands and anti-electrostatic gloves are strongly recommended and all devices, equipment and machinery must be properly grounded when handling the LEDs, which are sensitive to static electricity. Precautions should be taken against surge voltage to the equipment that mounts the LEDs. Unusual characteristics such as significant increase of current leakage, decrease of turn-on voltage, or non-operation at a low current can occur when the LED is damaged.

Revision History

Revision	Date	Contents of Revision Change	Note
Rev 1.0	May 5, 2016		
Rev 2.0	May 16, 2016		

About Rayvio

RayVio Corp. is an advanced health and hygiene company that delivers clean water and environments. RayVio helps protect billions from germs and creates new markets and revenue streams by enabling a new class of products. Its powerful and efficient UV LED technology can be integrated into a variety of applications, powering versatile on-demand solutions that give consumers control over health without chemicals or costly consumables. To learn more, please visit www.rayvio.com.